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AN OBSERVATIONAL DIARY OF THE HABITS—MOSTLY DOMESTIC—OF THE GREAT CRESTED GREBE (*PODICIPES CRISTATUS*).

By Edmund Selous.

April 27th, 1900.—I noticed to-day a pair of these birds swimming about together on a large sheet of water some miles from where I live. I did not then, through the glasses, see anything resembling a nest.

May 3rd.—This morning one of the birds is sitting upon a large structure of weeds which I imagine to be the finished nest. It would seem, however, that some touches are added even after incubation—or, at least, the laying of the eggs—has commenced, for now the other bird is swimming to the nest, and, when within a little distance of it, dives, and, coming up with some weeds in its bill, lays them at the edge of it. He then swims out to the same place, dives again, and returns with some more; and this he does five times in succession. I now go nearer, and, though I am still a considerable distance off, the bird upon the nest leaves it and swims away. I sit down against a tree, and she soon returns, and, giving a long lithe leap out of the water on to the mass of weeds, again settles herself down upon it. She sits quietly, and must certainly be either incubating or in process of laying the eggs. Yet every now and then she bends the head forward, and with the beak arranges, or at least moves about, the

weeds edging the structure. From her sitting so steadily, and her haste to return to the nest, I have little doubt that this is the female bird, and if so, as the male dived for weeds and brought them to the nest in the most accustomed manner, I imagine that both birds help in the building of it, for one can hardly suppose that the male alone does so. Whilst sitting the bird has her neck bent back between the shoulders in an easy curve, the head being just raised above the back, and held straight, with the beak pointing forward. On any alarm it is stretched a little forward, or raised straight up. When the female has sat like this for about an hour, the male again swims up, and, diving, brings some more weeds to the nest. He does this two or three times, bringing once a large green stalk of some plant or lily, and again quite a mass of weeds. The birds then, I think, arrange this a little together, but not much in this way appears to be done, and what is, principally by the male. There is then a short interval, during which the male swims about at a moderate distance from the nest, returning to which he now, to my astonishment, springs upon it, and, raising himself upright, or almost so, on his legs, which are placed as far back as a Penguin's, he pairs, or attempts to pair, with the female. If successful, the act is of extremely short duration, and, taking the water again, the male bird swims away. He returns, and again swims away several times at rather longer intervals than formerly, sometimes, but not often, bringing a little weed in his bill. During this time the female bird is occupied a little, but not, I think, very much, in arranging the materials of the nest. She is moving her head and neck freely about; but, if I mistake not, when she does this she is only preening herself. On one of the returns of the male bird, I notice that she bends down her head so that the beak, I think, touches the water, lying thus flat all along the nest; and whilst in this position the male swims to that side of the nest towards which her tail is turned, and seems two or three times to be on the point of leaping up again in order to pair as before, which, however, he does not do, but again swims off. The pairing, then, of these birds takes place on the nest, which, it would now seem, is not completed; nor can I think, under these circumstances, that the eggs are yet laid, or even that the hen is sitting to lay them. It would appear, that

however the nest may be built during its initial stages, the hen bird at one period sits on a mass of weed whilst the male brings fresh weeds to it. Whilst swimming in the neighbourhood of the nest the male bird was constantly preening himself, not only the neck and upper parts, but the whole ventral surface, to do which he turned himself sideways in the water, thus presenting to the view a broad expanse of silvery feathers. The above took place, roughly, between 6.45 and 8.45 a.m.

I return about 5.30 p.m., and find things much as before; one bird still sits on the nest, the other floats about rather than swims in the neighbourhood, at just the same distance. His head, now, is flung right back upon his back, at almost the middle of it, and the white neck and upper part of the breast gleam like silver in the sun. Occasionally he preens himself, when a greater surface of silver becomes visible; but a little of this is exposed, as he moves, all along the water-line. After a little the sitting bird turns round in or on the nest, so that her back is towards me. In the morning she was sideways to me in two directions, thus making three points of the compass, turned to which I have seen her sitting. I now walk all round the lake, and, coming at last to the nest—now of course empty—which is just off the shore, I find that it has one egg in it, partially covered over with the weeds, &c., of which the nest is composed. Assuming that this egg was laid not later than the preceding night—which is likely—then the pairing of the birds took place not only on the nest, but whilst the female was actually sitting on the egg, which to me is surprising. Both birds are now swimming about together, and when just in front of each other one dives and brings up some weed, which they both discuss in the friendliest manner, pulling it about, and perhaps eating a little, though of this I cannot be sure.* Shortly after this the male bird swims to the nest, and, after swimming round about it a little, is evidently preparing to leap up. This he suddenly does in a very lithe and lissom manner, with neck bent yet extended, seeming to dive

* The Great Crested Grebe is certainly a fish-eater, but, as its relative the Little Grebe, or *Dabchick*, feeds largely on weeds, it may also do so to some extent. The Dabchick may also feed upon small fish, but I have never been able to see it with an unmistakable one in its bill. I have seen it dive and bring up weeds, which it has then eaten.

upwards, the long beak spearing the air. The sudden revealment of his lithe wet outline seems to diminish his size, and he becomes in a much greater degree long, lank, and snaky, like a Shag. For a moment—as he alights—he stands almost as upright as a Penguin; then, bending snakily forward, with legs straddled wide apart, he waddles a step or two along the raft, seeming to feel for the eggs with the feathers between his legs; then sinks forward on his breast, and sits at ease with his head drawn down upon his back. The female bird now swims much farther afield—too far for me to make out what she is doing, but probably she is feeding. I have now seen plainly that when preening these birds turn very much on one side, thus showing in a gleam—bright to dazzling—the silver of the breast, or rather ventral surface, almost in its full extent. I leave at seven, there having been no further change on the nest.

May 4th.—At 5 a.m. I find the male bird on the nest. As I approach the tree from which I watch, and whilst still a great way off, he leaves it, but keeps close about, sometimes swimming a few yards away from it, then turning, diving, and emerging again just beside it. Then pressing against it with his breast, he cranes forward his neck, and looks into it, then coasts round it a little, again cranes his neck, and in a moment makes his lithe Cormorant leap, and is on it. The spring is very quick and sudden, yet smooth and without splash, suggesting that the bird has been oiled, or that he passes from oil rather than water. He stands but a moment—just one flash of a Cormorant—and then sinks flatly and smoothly down.

5.50.—The female, who has been before invisible, is now all at once there, and approaches the nest, swimming to it quietly and placidly over the sun-bathed mirror of the lake. It is clearly the female, for the other, the male, is considerably larger, and has a larger crest. Both birds remain quietly by the nest for a minute or so, the male turned sideways in the water so that full three-fourths of his beautiful silver breast is exposed; and as he preens it, assiduously spearing into the thick fur of feathers with his long finely-pointed bill, one of his finned feet or paddles is often raised above the surface of the water, and beats it idly. The female then takes her place on the nest, but her leap is not so lithe and subtle, so instinct with nervous energy, so

Cormorant-like as the male's. The male floats or swims about in the neighbourhood as before, continually preening himself. Sometimes he will make a little swift gliding leap up in the water and smartly shake his wings. This upward motion is very graceful and snake-like, for, as the body rises, the long neck, which seems but an extension of it, curves backwards, upwards, and again forwards as the bird sinks back on the water, the whole motion much resembling the quick forward glide of a serpent. The male bird makes now, at short intervals, four approaches to the nest, and at each of these the female lowers her head, and, with neck stretched forward, lies all along the nest, obviously prepared for and expecting his marital attentions. Each time, too, the male swimming to the right place at the nest and craning his neck over it, seems on the point of springing up, but does not do so. He preens the feathers of his neck, again seems about to spring, preens again, and swims away. After the fourth return he swam to a good way off, and remained some time away, after which there were three more approaches, when the same thing took place. The female must have put herself in position on the nest at least a dozen times, and would often slightly raise her head and look round at the male, then again lower it as before. On no other occasion have I seen her lie thus with her head and neck stretched straight out, and flat along the nest. I wish to make it quite plain that these actions of the two birds, seen, practically, by the aid of the glasses at a few yards distance, could admit of no other interpretation than that which I have placed upon them: so that, taken together with what I have already recorded, they seem to show that the nest is the habitual pairing-place of these Grebes.

After the seventh failure the female came off the nest, and the male bird shortly took her place. This was at 7. She then swam right away, and when I left about 7.40 she had not returned. On the third return of the male bird to the nest he dived, and came up with a large lump of weed in his bill, which he brought to the nest. On the fourth there was an incident with a Moor-hen. The latter stood just on the edge of the bank, which formed an abrupt grassy slope, and its presence seemed resented by the male Grebe, who swam towards it in a hostile manner. The Moor-hen retreated a little way up the bank, and

the Grebe returned to the nest; but, on the Moor-hen's again descending, he again swam towards it, this time in a little threatening rush, driving it right up the bank. This took place yet a third time, and then, before descending the bank again, the Moor-hen walked some way farther off along the top of it. This, it must be remembered, was not under the actual stress of an attack, but deliberately, and though it was evident that the particular spot off the water which the Moor-hen was thus leaving was the particular spot where it wished to be. Two attempts to return and a previous lengthy occupation are sufficient to show this. It is in little everyday things like this, I think, that one can best trace the working of reason in animals. Elaborate experiments in which they are placed under quite artificial conditions are of little value. I have read a whole series of such where Cats and Dogs were put into boxes which opened by a certain mechanical contrivance, and it seemed to be expected of them that they should calmly examine the interior with a view to piercing into this, the result, of course, being held to show that they had no reasoning power. Probably as long as they were there, their mental distress and confusion was such that they had not. When Foxes, however, and Wolverines walk round traps and examine them (as to which see Professor Romanes' 'Animal Intelligence') they *are* calm, and have their wits about them. Moreover, they have had time and that kind of vivid experience which impresses things on the *mind*—factors which, in the wooing of reason, are found sometimes to be almost as much needed by men as by animals. There is too much tendency, I think, to go by experiments made in the study rather than by those which nature may be said to make. The reason of this is not difficult to understand. Men, as a rule, are more comfortable in their study, and they admire their own or each other's ingenuity. But the greatest ingenuity can hardly ever give what is the most absolutely essential factor in all experiments where animal psychology is concerned, *viz.* natural—or at any rate accustomed—conditions. I therefore think that to watch an experiment made by nature is in nine cases out of ten much better than to make one oneself.

The Moor-hen seemed to know that the Grebe would not follow him up the bank, for always, though he might be a little

more or less frightened away, one could read in his actions the idea that there was no further need for exertion when he was once out of the "reach" of the latter's long neck. He thus took the minimum of trouble necessary to avoid the danger, and this I have often observed with birds. Moor-hens, though so pugnacious, know well their limitations, giving instant way, as a rule, even to a Coot when attacked by one. However, so do the weaker to the stronger ones amongst themselves.

Seen now swimming close, the Great Crested Grebe shows not a particle of his silver feathering—I speak, of course, of the under surface—above the water-line. In a wind the handsome crest or double tippet is being constantly blown back round his head and face, giving him a funny dishevelled appearance. It is of a fine orange* and black, whilst from amidst it projects the thin white face with the long sharp-pointed spear of a beak. The long serpent neck is brown on the back, white and silver-white on the belly, and, with the swelling crested head, makes the bird look like a Water-Cobra. His dive is sometimes quite informal, just lazily spearing the water, sinking a little in it before he spears it; sometimes it is with the right Cormorant leap upwards and then downwards, though much less vigorously carried out. Sometimes again the long straight-stretched neck with sharp pickaxe beak shooting out at a right angle sweeps down without a curve. Certainly one of the most ornamental of water-birds, and that it should *require* protection shows us to be still inappreciative savages.

He has just come up with a good-sized fish in his bill, which he shifts about till he gets the head downwards in it before swallowing. Yet fish abound in this water, and were far more numerous, according to all accounts, in the Norfolk Broads in those days when the Crested Grebe was also—a remark which can be equally well applied to the Otter. No doubt when we import Sheep and Goats into a country infested with Wolves, the latter must be got rid of, but it is the height of absurdity to interfere between one indigenous wild creature and another. All that we have to do is to leave them both alone, and both flourish. The very existence of a preying species must show an abundance of the species preyed upon in exact proportion to its own, as is—or was—well seen in a country like Africa.

* Or perhaps, rather, chesnut.

Our real efforts should be directed against ourselves—that is to say, against the inordinate love of one thing in us at the expense of another. It *ought*, for instance, to be for all as it is for many, a greater loss never to see such birds as Kites, Buzzards, Peregrine Falcons, Ospreys, Eagles, Ravens, &c., than it is a gain to have a larger number of Pheasants, Partridges, Grouse, or Blackcock to the end of killing more of them; and it *ought* to be an infinitely greater pleasure not only to *see* a bird or other animal in life and nature, but even to know that it is so, than to hold it dead in our own poor possession. That this is largely not the case shows lack of taste, lack of imagination, lack of a true love of nature. Let us supply these wants in our proper selves, and "keep down" those redundancies which prey upon them, and the cruel extermination —now in active process—of so many beautiful and interesting forms of life will cease. By preserving our own "balance"—the proper proportion of our tastes and pleasures—we should be preserving that of nature. What, for instance, would not a proper balance of appreciation in women as between their own beauty and that of birds effect in favour of the latter?

Extermination is a real evil. The desire to check it is not mere sentimentality, as some writers seem to imagine. "Why," for instance, asks Sir Herbert Maxwell* (and he intends the question as a *reductio ad absurdum*), "should not insects, which are preyed upon by birds, be as much protected as the birds?" Certainly, if it would be ridiculous to save some most beautiful butterfly from disappearance *at the hands of man*, it would be equally so to save a Humming-Bird or Bird of Paradise; but, as Touchstone says, "much virtue in your if." It is marvellous how men, who would be in despair (yet not more so than myself) at the threatened destruction of some fine painting or piece of sculpture, can see with imperturbability the *artificial* extermination of a living work. I admit that, when we look at, say, the Laocoon, the Assumption, or a portrait by Rembrandt, it is difficult to bear in mind the relative proportions of human and divine genius, but reason should tell us how immeasurably superior are the works of nature to those of art. If we must love killing, yet let us not, even as pure egotists, tolerate *making to*

* I am quoting not the letter, but the spirit, and this from memory. If I misrepresent, therefore, I must apologise.

cease, for the more cessation the less killing in the long run—the end should sanctify the means.

May 8th.—At 1.40 p.m. find both birds off the nest, and I can see, through the glasses, at least two of the white eggs quite distinctly. There was no question of the birds having been alarmed by me, for I was much beyond the limit at which I have ever alarmed them before. It would seem therefore as if the birds did not cover their eggs in leaving when not disturbed. In a minute or two the male makes his leap on to the nest, and sits on the eggs. In coming up to the tree from which I watch, I do not this time disturb him. As usual, I soon lose sight of the female, who has swum right away.

1.40.—The female returns to the nest, swimming quietly up to it. I do not see her till she is there. The male then stands up, gives himself a preen or two with the beak, and takes the water, when the hen with hardly a pause jumps up. She stands a little, and moves the weeds about with her beak before settling down. The male, on leaving, goes to the bank, and (I think without diving) brings from it to the nest a small piece of weed. He then swims twice a little distance out, dives, and, coming up each time with a good beakful, brings them both to the nest, and the female afterwards arranges them upon it with her beak. Thus day by day, while the birds are sitting, the bulk of the nest is added to, and always, so far as I have yet seen, by the male bird.

2.—The male bird has also now gone a good way off, but I still see him on the water.

2.25.—The male back at the nest, and there is now more arranging of the weeds by the two birds together. After this the male swims off again, there being no change on the nest.

2.55.—The female leaves the nest, in alarm, I think, at an approaching boy in charge of a flock of Sheep.

May 17th.—Upon coming here to watch again I find the nest plundered and destroyed.

May 19th.—Coming again this morning, about 6.30 a.m., I see one bird swimming by itself in the neighbourhood of the destroyed nest, and farther off a pair of them.

After some time the single male bird swims to and meets the female of the other two, she having swum to him, leaving her

companion—a male in splendid plumage.* When the two birds meet they remain for some moments at rest on the water fronting each other, their heads and necks close together, whilst each *tâtes* the other's bill with his own. They then swim down to a part of the water nearer to me, followed by the odd male bird, who when the others pause remains near about them, having a somewhat "out of it" appearance. The accepted male, which I believe to be the one whose nest has been destroyed, now swims towards him with neck drawn in, head lowered, and bill pointing straight forward just above the water-line. All at once, and when still a little way off, he dives; a moment or two afterwards there is a sudden start and retreat on the part of the rival bird, the other one reappearing on the surface a little behind him. In a minute or two this happens again, and this time it is more pronounced, the start of the attacked bird being much more sudden, his retreat more alarmed and rapid, whilst his enemy emerges just where he has been, having evidently attacked him under the water. Once more, about half an hour afterwards, this mode of warfare is exhibited, if possible, still more clearly. During the interval the discomfited bachelor bird has remained alone near the bank where the destroyed nest has been, and the married couple now swim directly down upon him. The male is in advance, and as he approaches he again exhibits the angry mien, holding the head low, with the neck drawn in and the beak pointed straightly forward, looking like a stiletto. But he swerves from his course, and seems now to be swimming towards the female, who has glided out to one side, and rides at ease—a spectator—when he dives. This, however, must have been a ruse, for a few seconds afterwards the unhappy persecuted male not only starts, but rises in great confusion out of the water, and flies right away to a distant part of the lake. From the moment of his flight I watch for the reappearance of the other, and, sure enough, he comes up shortly in the place, or approximately the place, that has just been left vacant. He swims about for a little with the head still lowered, and in a proud sort of way; then, raising it, goes to the female, and there is now between the two the same scene of gratulation as before, but much more marked. They again front each other with their heads and necks almost

* Yet not more so than the other male. All three, indeed, looked superb.

touching, and keep moving them from side to side in opposite directions, their two beaks crossing each other and shooting out suddenly on each side of the two necks like sharp little daggers. At the same time they both utter a short, quickly repeated note of a clucking or clacking description, strongly expressive of content and gratulation—and this they did before, though I omitted to note it. It is thus evident that it is the habit of these birds when fighting to dive and attack each other under the water, and this habit they share with the Black Guillemot, and no doubt with other diving birds. Judging by the way in which the one bird flew off, he must, I think, have received a very effective spear-thrust from the other's beak.

I now think it possible that I was mistaken as to its having been the male which I first saw alone by the ruined nest that went through the first congratulation scene with the female. It does not seem likely that a bird so favoured and victorious should have allowed a third party to "consort" with its spouse, and afterwards, till the final discomfiture of the third bird, the pair were always together. I might have mistaken the two birds, as one, at least, was frequently diving, probably the other also, but I cannot now recall it clearly. It is even possible that there may have been a transposition of the two owing to such an attack as I have described, but which, not being quite so salient as the other ones, as well as quite new to me, I may have missed. Still there is nothing except what seems to me now to be the probability of the case which should make me doubt the accuracy of my observation. But we have this point which is interesting, that the solitary and defeated male remained during the interval between two attacks made upon him near the place where the nest had been, and this was where I first saw the supposed other male. Now, what should a new arrival know about this nest of two other birds? unless, indeed, he had destroyed it; and then his feelings would not be of such a nature as to prompt him to hang sadly about it. But now, suppose that he had indeed destroyed it, ousted the other bird, and supplanted him in the affections of his wife, then we can understand that other one lingering near the ruins of his home. That this should really have been the case seems altogether improbable, but perhaps the *possibility* is not quite excluded. It was on the morning that I

first found the nest destroyed that I saw for the first time this third bird. That some drama had taken place between the 8th and the 17th I cannot help suspecting, and I regret now extremely that I was unable to watch during the intervening days. However, what seems most probable is that the nest was plundered and destroyed by someone,* that the two birds then swam about all day on the lake, and that an unpaired male, seeing a female whom he thought might possibly be also free, approached her with honourable intentions, for which she never forgave him.†

May 21st.—Arrive at 6 a.m. The two birds are swimming together, and I at once notice a new nest in the same place as the other, which has been built since yesterday. It looks, through the glasses, as large and substantial as was the first. The birds swim about together as usual, preening themselves, &c.; but in about ten minutes the male, with a little turn towards the female, as though to ask her concurrence, starts towards the nest, swimming straight on without pausing, in a purposive manner. Soon he dives, and, coming up with weeds, continues towards it, and works at it for some few minutes without being joined by the female; so that I begin to think the male alone builds the nest. After a time, however, the female comes, and at once shows herself the more efficient of the two (though the male is also very efficient), diving more frequently, and bringing up larger masses of weed. Both birds now work together quickly and systematically, generally diving for each load of material, but sometimes—and especially the female—collecting it from the surface near the bank. They must have carried perhaps a dozen cargoes between them before I take out my watch. It is then 6.20, and in the next ten minutes they bring, together, twenty-five cargoes. The female then—at 6.30—springs upon the nest, and lies all along it in the way I have described, wishing evidently to receive the male. He, however, does not respond. She soon comes off again (in less than a minute), and the building continues with the greatest activity, as before. "*Fervet opus*," and by

* The shepherd-boy, I may say, was half-witted, but this would leave him quite clever enough for the act.

† I have no doubt now that the bird I first saw by the nest was the male of the original pair, that the female going far afield—as she has often done—was courted by another male, and that this other one's remaining afterwards near the nest was mere chance.

7 o'clock forty-nine more cargoes—thus making seventy-four within forty minutes—have been brought by the two birds.

The male now swims to the bank, and stands up upon the sedge and mud at the extreme edge of the water. After standing a moment or two he sits, but soon again rises, then sits and seems resting. Afterwards he again stands and preens himself a little. The female meanwhile continues to work by herself, and brings ten more cargoes to the nest before desisting. This would be towards 7.30, for there has been some pause after 7, and afterwards she has not worked so quickly, besides being alone. During the greater portion of this time the male, who has reentered the water, has also been working, but, instead of helping the female as before, he is now carrying weeds to the bank where he has been standing and sitting. He swims out each time some little distance, and dives for them exactly as in building the nest. By 7.30 he has brought twenty-seven cargoes thus to the bank, arranging each one with his bill as at the nest. Then—at 7.30—he stands up exactly where he has placed the weeds—upon them, that is to say—having evidently been making a platform with them for this purpose. He shortly again takes the water, brings one more weed-load, and then swims away, joining, after a time, the female, who has by this time also desisted, and both birds now float idly on the water. I now walk along the bank to the nest, which I find to be twenty-three paces beyond the old one, and at another twenty-three paces beyond the new nest I find the little platform or foothold of weeds which the male bird has made. This is adjoining to and just on the extreme edge of the bank, where it is hardly above the water and more composed of sedge than soil. The nest is a massive structure, and seems to be anchored and kept in place by being woven, under water, in the growing weeds of which, uprooted, it is formed. Several long and water-logged sticks are also fixed amidst it by one end, the other end sinking down amidst the mud and weeds; so that they too help to hold it fast. I have several times seen the female, but not the male, placing and struggling with these sticks. One has, I may say, often to scribble very fast in order to keep up with the birds, and so must leave a few things to be added.

Now sticks, being usually pieces of floating spar from wrecks,

are stuck by the Shag amongst the mass of seaweed which forms its nest, and here it does not seem as if they could serve any definite purpose. May we not see in such things as this the origin—one of the origins—of the idea of ornament. Something felt to be necessary—large and conspicuous, but of no definite *use*—has, one may almost say, the elements of ornament within it, and even amongst ourselves, it is probable that many things are fiddled about and "arranged" as ornaments, with but a very slight æsthetic sense of them. Use passes insensibly into ornament, as one may see if one watches the laying of a cloth and setting out the things upon it. On independent grounds I came to the conclusion that these conspicuous bleached spars stuck amongst the brown seaweed of the Shag's nest serve now as ornaments, yet surely we may see in them the survival of a habit, once of definite service, to a river-haunting ancestry who built their nests on the water, and thus helped to anchor them. The Shag is more marine than the Common Cormorant, and there are other species, if I mistake not, who live wholly or mostly on rivers. An inquiry into the nest-building habits of the whole family might prove instructive.

Revenons à nos "podicipes." Judging by the insignificant appearance of the platform—made up of at least twenty-eight cargoes—and comparing it with the huge mass of the nest, one would say that the latter must be the result of thousands of similar loads. Yet I could see no trace of it yesterday, nor were the birds working at it that morning, at any rate after 6.30. Most birds that I have watched, build their nests almost exclusively in the early morning, nor did I ever see these Grebes do so at any other time.

This morning I occasionally saw both the birds swim with weeds to the nest, having one foot raised up above the surface of the water.

May 22nd.—Same place at 6.10 a.m., and find the birds building *another* nest a considerable way from the last—*i. e.* the second one—always in the same direction, and just off the bank. By 7 they had brought between them—as well as I could count—exactly one hundred cargoes of weed, and by 6.45, when a slight pause occurred, they had brought eighty-six. The last ten or twelve of the hundred were brought by the male only, who

continued to work thus alone for a short time afterwards; yet the nest, when I first saw it at 6.10, looked as large as the other, and as though it represented a great deal more weed than the birds had brought in these fifty minutes. They must, I think, have been working from earliest dawn. The male did not, this time, leave off nest-building to continuously build a platform, but on three or four occasions he varied the former by taking a cargo to a patch of very green and grassy-looking rushes, just off the bank, returning, then, to the nest and continuing to work as before. On the last of these journeys he brought a stick to the bank, and, having laid it down, he immediately stood up—I have no doubt upon it, as part of the platform. I had seen him standing there before, also, as well as sitting, shortly after I arrived. The male Crested Grebe therefore, at any rate, makes a platform of weeds, &c., at a little distance from the nest, on which to stand or sit during the building of it, and also probably during incubation. Both to-day and yesterday the female sometimes carried a very large mass of weed to the nest. Once yesterday her head and neck, as she dragged it, were pulled right back, and this morning her head was once almost hidden behind the mass she was holding. The male never carried quite so large a quantity, though his average was about the same, and he worked very quickly and eagerly. Generally he carried a longer and thinner piece, which would rest on his back and stream behind him along the water. To see him swimming thus draped, very quickly and straight as a die, to the nest was a pretty—indeed, a fascinating—sight. He would swim out from the nest, dive and emerge generally, if not always, with his head turned the other way—to it, that is—and swim back almost without a pause. He swam much faster than the female.

7.30.—I now notice the male bird making his platform or raft systematically, bringing cargo after cargo to it. He takes three or four (how many he may have taken before I caught sight of him I do not know), but now, at 7.35, both birds are at the nest again, and the female places a stick upon it.

7.40.—Male carrying loads to his platform again. He has carried, I think, two or three more, and now stands up, and then sits upon it in the same way as does the female on the nest.

7.43.—He is off again, and carries another load a little past

the nest, as though to take it to the platform; then hesitates, turns, and places it on the nest. The next bunch of weed he passes to the female, who takes it from him and deposits it on the nest, whilst he swims a little farther, and dives for more.

7.47.—Male taking a cargo to platform. He takes four in succession, then meets female at nest, and passes her a load as before, which, however, she allows to drop. One of the birds now jumps on to the nest, and sits there a moment or so; then off again. I think it was the female, but am not quite certain.

7.55.—The male is now again taking loads to his platform, and also to the nest; but he has taken some four to the former, only one to the latter. He then takes two more to the platform. I now again see the third Grebe in the distance, but he keeps aloof, and plays no part in the drama.

The morning's work seems now (at 8.10) to be finished, and I can only see one of the two birds a long way from the nest. I leave at 8.15.

This occasional hesitation of the male between the nest and his platform, as though he were in doubt to which to take his load of weed to, is a thing to be noted, for it may throw a light on the possible origin of the habit of making such a platform—that is, supposing such a habit to exist; but as to this, other questions now arise. Why should the birds, having almost completed one nest, have commenced making another? Let us suppose that, owing to restlessness at the destruction of the first nest, or, again, to what we may call a wandering of the instinct—which last a male bird might be more subject to in nest-building than the female on account of the habit having been more lately acquired by the progenitors of the former than of the latter, and being therefore less fixed—let us suppose that from either of these causes, or from some other cause, the male bird had wandered, and begun to deposit his loads in another place; then, the female, seeing him do so, might have followed his example, in which case what had seemed a platform made for a special purpose would have become another nest. On the other hand, let us suppose that the female is not to be led away by the unsteadiness of the male, and that she by persevering

brings him back, then we have the nest and a small collection of materials near it, which the male, having once begun, would be likely to add to to a certain extent, never getting it quite out of his mind, so to speak. His occasional hesitation between the two would be quite natural, as natural, I think, as most other hesitations either in man or beasts. It is not difficult, then, to imagine the inchoate nest being put to some other purpose, or even that it might be *either* so put, or become another nest, in the case of one and the same bird or pair of birds; or that some birds of a species, till the habit had become fixed in one or another direction, might be more prone to do the one thing, and some the other. Thus there would be a fluctuating and personal element —something, I think, should be allowed for the personality of each individual creature. Of course, if such an explanation would account in any degree for a superfluity of nests, or for uncompleted nests being put to some other purpose in the case of Grebes, it would do so to the same extent in the case of other birds; and here we come to the one or more extra nests—usually called "cock-nests"—built by Wrens, and the conflict of evidence or opinion as to whether these extra ones are or are not put to any special purpose. But it is not only Wrens—or, as we have now seen, Grebes—that abandon the nest they have been building, and build another. Blackbirds—and here it is the hen only that builds, though closely attended on by the male —are liable to do the same; for I watched a building pair most closely this spring, and, when the nest was almost finished, it was abandoned—quite capriciously, as it appeared to me—and another commenced not far from it. For this reason, and from what we know in regard to the Wren, I do not think the destruction of the original nest was the cause of these Grebes building a *third* one as well as a second. I attribute it to unsteadiness, or what I have called wavering of the instinct—not meaning by this to wrap up ignorance in a phrase, but rather to imply that no specially induced cause need be assumed. As nature can thus act in the female, one might expect her to do so more often, and in a greater degree, in the male, when he is also the builder.

Before leaving this subject I will just hint the possibility—for here I can do no more—of abandoned nests being the origin of

the bower or run of the Australian Bower-birds. Had these two Grebes paired or coquetted about the *old* nest whilst they were building the new one, here would have been, in fact, something very like the actual bower; and that a nest might come in time to be regularly made for this special purpose, and then used more generally, and also to be more and more ornamented and modified owing to general or special causes (with regard to which latter I would refer again to my previous remarks), should not seem very astonishing to any evolutionist.

Once let there be pairing on the nest—which I have seen in other instances—and the bower, as it appears to me, is no longer such a mystery.

Of course, I am aware how widely the bower often differs from the nest of the same bird, yet not more widely than does one nest, or even one bower, from another, or than a palace or other elaborate building differs from a savage dwelling, or even from a small house or cottage.

Differences in the site chosen for the nest and bower may offer a difficulty, but, if I mistake not, the principle of evolution has been accepted as overcoming greater difficulties than this. Birds, indeed, exhibit great adaptability in the placing of their nests.

It is true that in standard works of ornithology we are told that the "bowers" have nothing to do with the nests of the species making them, whilst, at the same time, complete ignorance as to their origin and meaning is confessed. If we know nothing about a thing, how do we know that it has nothing to do with some other thing? On the other hand, when we find a vast number of birds making a certain structure—the nest—which is an outcome and effect, with them, of the sexual instinct, and when we find also a few birds making, besides the regular nest, other structures of a more directly sexual character—as to which one has only to read the accounts, or to observe the actions, of the Satin Bower Birds in the Zoological Gardens—the *prima facie* likelihood would seem to be that there is, and not that there is not, a connection between the two instincts.

May 23*rd*.—First I will say that I forgot to note down yesterday that, after the birds had been building some little while,

the female not only ascended the nest, but lay along it as before, with the same evident intention of receiving the male, and the same non-result.

At 5.30 a.m. I find the birds not working, but floating idly on the water. They are now side by side, each with the long neck drawn back, so that the head rises like a button from the centre of the back, making them look like pork- or game-pies floating about.

6.8.—Both now swimming to the nest, and when just off the bed of weeds where it is situated, first one and then another of them lies on the water, with the beak held down in a somewhat curious manner, as though minutely observing it, for the beaks point in its direction. It is the female who does this first, and I thought she wished to receive the male, for her attitude was just the same as when, upon the nest, she undoubtedly intended this. She soon desists, however, and it is then that the male assumes the same attitude, in which he continues longer.

At 6.30 the male goes again to the nest, and remains about it, but never going quite up to it, for some five or six minutes; then swims again to the female, who has not accompanied him. The interest taken by the male in the nest has been very marked throughout, more so even—in appearance, at any rate—than that of the female, though in the actual building of it she has been yet more efficient than he. He has always led the way to it, and yesterday—as noted—he continued building longer than she did.

6.54.—Male at nest as before, and begins now to dive and add to it. After a minute or two he ascends the nest, and I shall now—as hitherto—record exactly what I saw. After standing a little with straddled legs, he sinks down, and lies along the nest in just the same manner, as far as I can see, as the female has done, once before actual or attempted pairing, and many times, as prepared for and wishing it. The female is now swimming up, and, on arriving at the nest, she acts exactly as the male has done when contemplating ascending it in order to pair with her. Both in action, manner, and strongly implied intent the sexes seem to be reversed, yet there is no

doubt as to which is which, for the male is very considerably larger than the female.

The male rises once or twice, standing upright, and each time lies along again in the same attitude, the female continuing to act as described. Finally, however, the male takes the water, and begins again to fish up and bring weeds to the nest. In a little while the female ascends the nest, and lies along it just as the male has done (and she herself formerly), though perhaps with a greater earnestness and wraptness. Besides the marked difference in size, I should say that, since the descent of the male, I have kept the two birds quite distinct. Nor have they been close together, but wide apart; for the male, as he came down, swam to the bank, and then along it, whilst the female swam out into the middle of the lake. The male now comes up to the nest, where he first acts in the same way as he has done before, and as the female has just done; and then, after a few moments, leaps up, coming down and standing firm and upright on the back of the female some way forward towards the centre of it. Either he now, or the female, or the two birds together—as I think is the case—utter a sharp little note of one syllable, quickly repeated, which I can hear plainly, though faintly. But the attempt to pair is unsuccessful, the male bird being, apparently, unable to move backwards, and soon passing forwards along the back of the female, and so taking the water. Judging from this, and from the first occasion, the pairing of these birds would seem to be a matter of some difficulty. There is no second attempt, but the male begins to preen himself, and the female soon entering the water, both birds swim away.

7.50.—The two birds swim again to the nest, and the female now lies along on the water just off the bed of weeds in precisely the same attitude as on the nest during the pairing. The male bird comes up as though about to pair, then passes by her, returns and passes again, and, at the third time, swims right into the weeds near the bank, where he lies along in the same manner, just as she has been doing, and as he has before done, both on the water (though I did not then catch the import) and on the nest. There is no difference in the action and attitude of the two birds; one seems as strongly indicative as the other. The female now, whilst the male is still acting thus, or immedi-

ately after he has done so, ascends the nest, and lies along it in the usual manner. The male ascends as before, and it would seem that this time the pairing is accomplished. I, however, only judge so by the subsequent behaviour of the two birds, which has that satisfied appearance as of something successfully accomplished, which all who have watched birds will know. The time occupied was extremely short, and one would hardly have thought from the position of the two birds that actual pairing had been possible.

It will thus be seen, that before each of these pairings or attempts to pair, the male Grebe assumed the posture proper to the female on such occasions, and the first time actually went on to the nest in order to do so, that being, it would seem, the chosen spot for the performance of the nuptial rite. Except for this, and to take his share in incubation, I have not seen the male bird (nor, for that matter, the female either) ascend the nest; neither would one expect him to do so, as the birds do not ascend to build or shape it, and also he makes himself a special platform. I therefore attribute his doing so, as also the concomitant actions, to a peculiar, and, as we would call it, perverted sexual activity, in which, moreover, the female shared. I should say that during the last pairing the cries of the birds—for they were evidently uttered by both of them—were louder and more pronounced than before, and also of two kinds. The first and loudest note uttered was sharp and shrill in quality, approaching to a kind of screaming. The other I cannot now distinctly recall.

Now, with regard to the curious apparent change of sex in these two Grebes, I here recall what I have observed in the case of a pair of dovecot Pigeons, *viz.* that, immediately after the ordinary pairing of the birds, the male would crouch to the female, who then performed, apparently, the office of the male; so that anyone seeing the two, and unacquainted with such possibilities, would have sworn absolutely that the female bird was the male, and *vice versâ*. Should this appear incredible to some, I can only say that I saw it take place right in front of me, not once merely, but several times, and at no more than a step or two's distance—in fact, under such circumstances as eliminated the possibility of mal-observation.

Darwin, speaking of domesticated birds, says ('The Descent of Man,' p. 415) "these are often pampered by high feeding, and sometimes have their instincts vitiated to an extreme degree. Of this latter fact I could give sufficient proofs with Pigeons, and especially with Fowls, but they cannot be here related."

Possibly he may refer, amongst others, to such instances as the foregoing; but, if we can thus account for them in the case of Pigeons, what are we to say in regard to a pair of Great Crested Grebes, living a natural life upon a sheet of water as large perhaps as some of the smaller broads or meres? If we say it is vitiated or perverted instinct, still there must be a natural cause for what we regard as the perversion. As is well known, hermaphroditism preceded, in the march of life, the separation of the sexes, and all of the higher vertebrate animals, including man, retain in their organisms the traces of this early state. If the structure has been partly retained, it does not seem unlikely that the feelings connected with it have, through a long succession of generations, been retained also, and that, though more or less latent, they are still more or less liable to become occasionally active. This view would not only explain such actions as I have here recorded, but many others scattered throughout the whole animal kingdom, and might even help to guide us in the wide domain of human ethics.

May 24th.—Same place at 6.15 a.m. The birds are floating together again, like pork-pies on the water, but up till now (7.15) they have not approached the nest. I have then to leave.

May 25th.—Between 3 and 3.50 p.m. the birds are not at the nest, but swimming about near the opposite bank, and I think I notice in them some disposition to build another nest. The male, having swum to some distance from the bank, returns very fast to it with the other Grebe. All at once he dives, and, coming up near the bank, makes a sudden dart, and spears forward with his beak, to the confusion and flight of a Moor-hen. It is now, therefore, evident that one way, at least, of fighting adopted by these birds, is to dive, and either attack under water or just after rising—I say one because, on the first occasion, when I saw the male attack a Moor-hen near the first nest, he did not dive. I now think it probable that the first Moor-hen was attacked because he was near the platform of the male Grebe

(possibly he had been using it), and the second, because he was near a contemplated one.

May 28th.—At about 6.30 this morning the birds were not at the nest, which they seemed to have abandoned, nor were they building another.

This was the last observation I could make on these birds, for I had now to leave for the Shetlands. When I returned in the latter part of July, they were swimming about with two young ones, which, in size at any rate—their appearance was very different—were getting well on towards maturity. On these I made a few notes, which I have now lost. Though I saw much to interest me in the Shetlands, I sometimes think that I should have learnt more if I had stayed and devoted the whole intervening period to these Grebes, that I was able to watch so closely and continuously. In such watching an unbroken sequence is of great importance.

NOTES AND QUERIES.

AVES.

White Wagtails near Southport.—While walking along a bridle-road within about two hundred yards of the shore on the north side of Southport, on April 20th last, I noticed a pair of White Wagtails (*Motacilla alba*) running about. Observing their fearlessness of my approach, I sat down on a sand-hill close by, and watched them feeding only a few feet from me. I noticed that one was a female, having much less black on her head than the other. Suddenly a Pied Wagtail appeared, and drove the white ones farther away. At high-water mark (the tide being out) I noticed, within a distance of two or three hundred yards, more than half a dozen White Wagtails scattered about, and concluded that a migration of them was proceeding along the coast.—G. Townsend (Polefield, Prestwich, near Manchester).

[Several instances have been recorded of interbreeding between the White and Pied Wagtails.—Ed.]

The Vibrating Sounds of the Lesser Spotted Woodpecker.—I have been much interested in reading the note by Mr. C. H. New respecting the tapping sound of this species (*Dendrocopus minor*), (*ante*, p. 107). It is fairly common in this district, and I have often wondered how such a mysterious noise could be produced by the bird tapping with its bill on a branch or trunk of a tree. In April of last year I was attracted to an orchard on Milton Hill, Wells, by the sound in question. I located the bird in the branches of an apple-tree, which it left, and flew to an oak in an adjoining field. Here exactly the same sound was produced, but the bird left the tree again as soon as I got within a few yards, and flew to an elm growing in a hedge bordering the roadway, on the other side of which is a plantation known as the Coombe. I went down into the road, and watched the bird several minutes before it flew away; here the same sound was produced as from the apple- and oak-trees. I also noticed that whilst it shifted restlessly about the very small branches at the top of the tree the noise did not vary, resembling somewhat in miniature the sound uttered by the Nightjar, or drawing a stick with great rapidity along iron railings. I am inclined to believe the sound is uttered from the bird's throat, and used as a call- or mating-note during nesting-time. I have never to my

recollection heard it in autumn or winter, the exceptional sound of which has evoked a remark from Mr. New. If the sound was caused by tapping, would it not be heard at all seasons? Again, it can be heard a considerable distance; but, if a tap, would it not be lost at thirty or forty yards?—STANLEY LEWIS (Wells, Somerset).

[Seebohm, on the Petchora, relates a different appreciation of this sound. He writes of the "Three-toed Woodpecker" (*Picoides tridactylus*): "On another occasion we heard the tapping sound of the Woodpecker's beak; a tap, then a slight pause, followed by a rapid succession of taps, and, after a second slight pause, a final tap. I imitated the sound as well as I could with a cartridge on the stock of my gun. The bird immediately flew to a dead larch-trunk close to where we were standing, and perched, its head thrown back, listening, some fifty feet from the ground. In this position it fell to my companion's gun. It was a female" ('The Birds of Siberia,' p. 110).—ED.]

Glossy Ibis in Durham.—An example of the Glossy Ibis (*Plegadis falcinellus*) was shot by a farm-servant at Billingham Bottoms, near Stockton-on-Tees, on the 25th of November last. I am informed by a naturalist friend, who has seen the specimen, that it is "apparently an adult, with the beautiful shot-green reflections on the back; unfortunately the sex was not noted." Of other records in the north-eastern counties, I have three for Yorkshire, and one is mentioned by Hancock in Northumberland, on the river Coquet ('Birds of Northumberland and Durham,' p. 130).—T. H. NELSON (The Cliffe, Redcar).

Early Breeding of Wood-Pigeon and Snipe.—Two instances of early breeding of birds in West Suffolk in an unusually cold and backward season seem worth recording. On April 3rd a fully-fledged young Wood-Pigeon fluttered down from a nest in an ivy-covered tree in our grounds; and on April 16th my son found a clutch of four newly-hatched Snipe. The eggs in this nest must have been laid in March.—JULIAN G. TUCK (Tostock Rectory, Bury St. Edmunds).

Varieties of the Dunlin (Tringa alpina).—The remarks of Mr. Backhouse under the above heading (*ante*, p. 91) caused me to measure carefully the birds in my collection, as well as some kindly lent me by Mr. N. F. Ticehurst. Although these measurements, to a certain extent, bear out Mr. Backhouse's remarks—*viz.* that the short-billed form is rather different in its habits to the large-billed form, and is found in different situations, or, if the same locality, under different conditions of weather, &c.—yet, on the other hand, one can hardly take the view that there should be two distinct species so closely allied, having—for, at all events, a great portion of their range—a similar distribution. As far as one can judge, the

questions of age and sex may be disregarded, as the sexes are the same size, and, once the young are able to fly, their bills and wings appear to reach their normal adult development. As will be seen on reference to the list of measurements, almost all the specimens were obtained in two localities a few miles apart, namely, between Dungeness and Littlestone in Kent, and at Rye Harbour in Sussex. At Littlestone there are no drains, and the shore is merely a flat stretch of sand and shingle; while at Rye there is a large extent of shore, a river with high banks uncovered at low water, and a small salting intersected by drains. Of the ten birds from Littlestone, only one is of the small form; and of twelve specimens from Rye, half of them belong to the short-billed race—a result which certainly tends to confirm Mr. Backhouse's remarks. It is unfortunately not noted which of the Rye birds were shot on the shore, and which in the drains, or possibly the results might be of a still more confirmatory character. Of two birds, however, shot on the fjeld near Vadsö, in Norwegian Lapland, one belongs to the large race and one to the small, and these birds were at that time breeding near the same place, and in a precisely similar situation, *viz.* a wet swamp on the fjeld some two miles from the coast. Mr. Barrington, in his recent work on the Migration of Irish Birds, gives the measurements of the wings of twenty-four examples, showing all variations from 4·87 in. to 3·95 in., neither form preponderating at any particular station. If these forms were in reality distinct races, we should expect to find either (1) that there was a distinct break in the continuity of the measurements, or (2) that their geographical distribution was different—at any rate, during some period of the year. But, as neither of these tests is borne out by the facts, and wherever the species is found both forms occur in fairly equal numbers, they can only be considered as the extremes of a very variable species. It is at the same time interesting to note that the difference in length of the bill is to a certain extent correlated with different habits, and, if one may be permitted to theorise, it seems probable that in this case the bill has influenced the habits, and not *vice versâ*, as is generally the case.

LARGE FORM.

			Bill.	Wing.
Dungeness	♂	adult, September	1·46 in.	4·75 in.
,,	♂	young, ,,	1·22	4·86
,,	♂	,, ,,	1·24	4·75
,,	♂	,, ,,	1·26	4·74
,,	♂	,, ,,	1·26	4·51
,,	♀	,, ,,	1·47	4·75
,,	♀	,, ,,	1·26	4·5
,,	♀	,, ,,	1·22	4·52
,,	♀	,, ,,	1·18	4·51 (doubtful
Rye Harbour	♂	,, ,,	1·34	4·75
,,	♂	,, January	1·24	4·7
,,	♂	,, ,,	1·35	4·75

			Bill.	Wing.
Rye Harbour.....	♂	young, September...	1·37	4·75
,, ...	♀	,, ,, ...	1·23	4·7
,, ...	♀	,, ,, ...	1·28	4·25
Boston, Lincolnshire..		adult, October.....	1·27	4·37
Vadsö, Norway.....	♀	,, June	1·31	4·63

SMALL FORM.

Dungeness	♀	young, September...	1·2	4·25
,, ...	♀	,, ,, ...	1·13	4·5
Rye Harbour.....	♂	adult, ,, ...	1·1	4·5
,, ...	♂	,, August	1·1	4·15
,, ...	♂	young, September...	1·18	4·5
,, ...	♂	,, ,, ...	·98	4·5
,, ...	♀	adult, August	1·12	4·25
,, ...	♀	young, September...	1·09	4·36
Boston, Lincolnshire..		October	1·14	4·5
,, ,,	♂	,, ...	1·12	4·0
Hunstanton, Norfolk..	♂	young, ,, ...	1·16	4·5
Vadsö, Norway.....	♂	adult, June	1·12	4·0

J. L. BONHOTE (Ditton Hall, Cambridge).

Varieties of the Dunlin.—Seventeen or eighteen years ago the late Mr. Blackett Greenwell, of Alston, gave me the skin of a very small Dunlin, and told me that it was one of the Crossfell race, which I am sufficiently familiar with in life, though I never shot a breeding Dunlin on the fells. I have seen many hundreds of Dunlins on the Solway Firth in the breeding season, and with a good glass examined them at their nests as closely as if I had held them in my hand, but I never met with a bright-coloured Dunlin on the marshes of the Solway Firth. The Solway Firth birds lack the broad dorsal margins of chesnut which exist in the typical "fell" Dunlin, and which are likewise characteristic of the large Dunlin, which Dr. R. B. Sharpe has separated as *Pelidna americana* (Cat. Birds, vol. xxiv. p. 608). I think that the breeding Dunlins of the Solway Firth would average rather larger than the fell Dunlin. They have longer bills than my Crossfell bird, which is the typical bright-coloured "drain Dunlin" of some east-coast ornithologists. The Dunlins which swarm on the Solway Firth in the latter part of August and September are principally birds of the larger British race, possessed of far shorter bills than the typical American Dunlin, but easily distinguished from our small breeding Dunlins. I can match the Dunlin, which Mr. Greenwell considered to be the typical fell-side Dunlin, with two east-coast birds—one, a male obtained at Great Yarmouth on May 12th, 1875; and the other, a female procured at Greatham on May 28th, 1866. These three agree in having very short bills, and in having the feathers of the upper parts broadly fringed with chesnut, a feature which is *not* characteristic of the marsh-loving Dunlins of the Solway Firth. Though at one time I had occasion to shoot a good many Dunlins,

I never, so far as I can recollect, shot a Dunlin in the breeding season; I therefore, cannot say, that the larger race of Dunlin may not occur with us in nuptial dress; but I have known for many years that the fell-side Dunlins were our smallest and brightest coloured birds, while the birds of the marshes are rather larger, and lack the bright colour of the Dunlins of the fells, being probably intermediate between the birds of our mountainous areas and the larger Dunlin which comes to this country in tens of thousands as an autumn and winter visitor. But as to the smallest race of Dunlin being separated as a valid species, I should certainly vote against any such decision. It would be quite as easy to make several species of the common Goldfinch as of the European Dunlin. There is the greatest difference in size and plumage between the smallest race of Goldfinch found in the Mediterranean sub-region and the very large Goldfinches which are procured in some parts of Russia. But so many intermediate specimens can be found that bridge over the differences between the extreme types, that it is much more satisfactory to recognize the various races as being merely local variations from the original type.—H. A. Macpherson (Pitlochry, N.B.).

Black Tern in Cheshire.—On June 4th last year, when at Budworth Mere, with Mr. P. G. Ralfe, we saw three birds of this species (*Hydrochelidon nigra*) in breeding plumage. They were very tame, and we had a good opportunity of watching them; they were evidently feeding, as they were beating up the mere against the wind, and from time to time, after a slight check in their flight, would dash on to the water, and again resume their search. They often settled for a short time on the uprights of an old fence which ran into the water.—Frank S. Graves (Alderley Edge).

Black Tern in Cornwall.—A flock of Black Terns (*Hydrochelidon nigra*) has for some days frequented the Marazion Marsh, which is a considerable stretch of marsh-lands containing one large pool and several smaller ones, about two and a half miles from Penzance. I first observed a pair on Friday, April 19th, and, on visiting the spot on the next day with my brother, Mr. P. G. Harvey, we found from twenty-five to thirty hawking over the "main" marsh. By the aid of a field-glass we made out that they were in an advanced state of plumage, most of them being in practically full summer dress. They are most active about 5 p.m., when they regularly quarter the marsh in their search for food, which they snatch from the surface of the water, uttering their shrill cry incessantly, and forming such a sight as to attract the attention of the most unobservant. They rest in the middle of the day on any convenient bank surrounded by water, and in the evening, about 7 p.m., they bathe before settling down for the night. I have never seen or heard of this bird in West Cornwall for many years,

though probably some are to be seen in the fall of the year. — Arthur W. Hext Harvey (Penzance).

Notes from Shetland. — On March 26th I caught a Song-Thrush (*Turdus musicus*) in the garden. This is the second one, only, I have seen since coming here in October, 1898. The first one was brought to me alive on Nov. 15th, 1898, and was immediately set at liberty. During the winter six Short-eared Owls (*Asio accipitrinus*) have resided in the plantation, and it has often amused me to see three or four of them at a time flushed and mobbed by numbers of Hooded Crows, the Owls not seeming to mind much, and quite able to hold their own. On Jan. 11th last I picked up from among some shrubs a mangled specimen of a Long-eared Owl (*Asio otus*). There was a large wound on the back of the neck and head, probably inflicted by a large Hawk. A White-tailed Eagle (*Haliaëtus albicilla*) has been frequently seen during the winter. On March 4th a large flock of Rooks (*Corvus frugilegus*) arrived here. April 11th was the date of their arrival last year. Though I am informed that the Rook breeds in the neighbouring islands of Orkney, I am unable to ascertain that it has ever done so in Shetland, though numbers remained here during last summer.—T. Edmondston Saxby (Halligarth, Unst, Shetland).

Some March Notes from Aberdeen.—The first appearance here of the Curlew (*Numenius arquata*) was on March 3rd, and on the same date I heard the spring notes of the Golden Plover (*Charadrius pluvialis*). I also heard a Bleater-Snipe (*Gallinago cœlestis*) bleating in the manner peculiar to these birds on March 6th. The Pied Wagtail (*Motacilla lugubris*) made its appearance at the same time. The Common or Green-billed Gull (*Larus canus*) came inland on the 11th, while a flock of Wild Geese crossed over here on the 20th of the month. A specimen of the Common Redshank (*Totanus calidris*) appeared on the 22nd. This bird only visits here by turns, and it is doubtful whether it breeds in the neighbourhood, though I believe that a pair have occasionally done so; but they only appear occasionally in this immediate locality. A prominent observation of the month has been the severe privations of birds caused by the very cold and stormy weather. I noticed a heavy death-rate among Lapwings (*Vanellus vulgaris*), which fall easy victims to severe weather at this season of the year. In fact, these birds seem very deficient in caution, as any genial weather leads them inland to their proposed summer haunts, and when a snowstorm, such as we have recently experienced occurs, they are reduced to extreme privations, and many succumb. There has been a heavy death-rate here; the remains of the unfortunate birds are numerous, generally near fresh water, where they had congregated in want of food and shelter. They constitute a forcible example of a species of birds which, although now

protected during the nesting season, and should thus increase in number, still receive at times such a check from severe weather as considerably diminishes their ranks.—W. Wilson (Alford, Aberdeen, N.B.).

ANIMAL INTELLIGENCE.

In this magazine (1897, p. 29) I ventured to repeat the statement made to me in the Transvaal, that the Chacma Baboon can count up to three, but not higher. I have just read in the recently published Seebohm's 'Birds of Siberia,' in connection with the Grey Plover (p. 154):—"Our* little manœuvre of walking away from the nest in a body, leaving one behind lying flat on the ground to watch, under the impression that the bird could not count beyond three, and would think that we had all gone, was clearly so much artifice wasted." The two impressions are so very similar that it would be not only interesting, but important, if any of our contributors could add further suggestion or information on the question.

With all our increasing bionomical information, we know practically little as to the intelligence of animals other than ourselves. We teach them to obey, and in some cases make them understand what we want them to do, but never seek to put ourselves in real communication with them. Recently much has been said and written as to our opening communications with the inhabitants (?) of Mars. Would it not be more feasible to try and communicate with the animal life of this planet? Language is not necessarily articulate, and it has been proved that the gesture language, when acquired by deaf and dumb mutes, is understood by other primitive races. We know that animals do communicate with each other. How do they do it, and how may we participate in the process?—W. L. Distant.

* Mr. J. A. Harvie-Brown was the comrade of Seebohm in this expedition.

NOTICES OF NEW BOOKS.

American Hydroids. Part I. *The Plumularidæ.* By Charles Cleveland Nutting. Washington: Government Printing Office.

This is the first part of a folio publication devoted to these lowly but most interesting forms of animal life. It appears that the great concourse of Plumularian life in American waters was almost unknown to the earlier workers who studied the group. In 1862 the elder Agassiz, in his 'Contributions to the Natural History of the United States,' included only three species of *Plumularidæ;* three years later his son, Alexander Agassiz, recognized six species; Prof. Allman, in studying the material secured by Pourtalès in the Gulf Stream, enumerated or described no fewer than twenty-six species; and, irrespective of the contributions of other workers, "at the time of the inception of the present work, it is doubtful if more than fifty species of *Plumularidæ* were known to occur in American waters." Prof. Nutting gives descriptions and figures of some one hundred and twenty-one species, and remarks:—"It is now evident that the West Indian region is the richest in Plumularian life of any area of equal size in the world. Not even the Australian region, hitherto regarded as by far the most prolific in these exceedingly graceful organisms, can equal our own southern waters in profusion of genera and species." From a study of all the data obtainable, Prof. Nutting inclines to the conclusion that Plumularian life increases in species down to a depth of 500 fathoms. Below that depth the data are insufficient to warrant any deductions. This publication is embellished with thirty-four excellent plates, and again attests the excellent and exhaustive manner in which zoology is fostered in the United States of America.

Zoological Results based on Material from New Britain, New Guinea, Loyalty Islands, and elsewhere. Collected during the years 1895–97. By ARTHUR WILLEY, D.Sc., Lond., &c. Parts III., IV., and V. Cambridge: at the University Press.

PARTS I. and II. of this truly biological publication were noticed in 'The Zoologist' for 1899 (p. 90). Since that time three more parts have appeared, and have maintained the standard which the authors of the first instalments so well initiated. It is difficult indeed to adequately draw attention to Parts III., IV., and V. The authors are many, the subjects numerous, and, we may add, relate to animals unfortunately *caviare* to most of our readers. Thus the *Enteropneusta*, described by Dr. Willey, represent a group scarcely recognized by many zoologists of other special studies, and their position in animal life understood by still fewer; and yet inspire a communication that really makes for a knowledge of organic evolution. Evolution to-day is the talk of the man in the street; though its principles are understood by so few, that it is practically—so far as technical knowledge is concerned—confined to the consideration of experts. The most popular doctrines are generally those least understood outside the circle of serious students. In Part IV. ornithologists will find "A contribution towards our knowledge of the pterylography of the *Megapodii*," by Mr. Pycraft; while the Robber Crab (*Birgus latro*), too often considered as having its young born resembling the parent, is well described and illustrated in Part V. by Mr. Borradaile as producing its young in the zoæa stage. These short notices give no proper digest of the contents of these last published parts; but, for the reasons given above, further review is beyond our space. It is a work for consultation rather than for quotation, and it is a sign of the times that several of the contributors are ladies.

First on the Antarctic Continent, being an Account of the British Antarctic Expedition, 1898–1900. By C. E. BORCHGREVINK, F.R.G.S. George Newnes, Limited.

A KNOWLEDGE of the Antarctic regions is as much desired by zoologists as by geographers. Many problems in zoo-geography

were considered as of probable solution when the fauna of these frigid wastes was studied, and we are indebted to the generous enterprise of a private citizen, Sir George Newnes, that this expedition was made possible. It was accompanied by Nikolai Hanson, an accomplished zoological collector, who had already done good work for both the British and Christiania Museums, but who unfortunately succumbed to disease, and was buried on this lone continent.

The zoological results which will interest most of our readers are to be found in Chapter VII.—"Among the Penguins"—*Eudyptes adeliae* being the dominant species; and the question was solved as to the black-throated and white-throated Penguins being one species at different stages of plumage. The worst enemy of these Penguins is a Skua (*Lestris*), "which constantly soared over their nests, watching for an opportunity when they might steal an egg or catch a young one." The author claims, by the discovery of species of insects and members of the shallow-water fauna, to have further proved the existence of bipolarity, and we may expect to hear more of this expedition when the whole of the biological collections have been worked out.

Text-Book of Zoology, treated from a Biological Standpoint. By Dr. Otto Schmeil. Translated from the German by Rudolph Rosenstock, M.A.; edited by J. T. Cunningham, M.A. Part II. Birds, Reptiles, Fishes. Part III. Invertebrates. Adam & Charles Black.

Last year a notice of Part I. of this publication appeared in our pages; we have now received Parts II. and III., completing the work. We then appraised this 'Text-Book' as supplying a want in introductory Zoology to school children, to whom zoology is not an end, but a part of a liberal education. We still hold that opinion despite many lacunæ, and a general absence of progressive nomenclature and classification. But to impart that information is not the aim of the publication; it is rather designed to describe an animal as it is, more than its evolutionary position in the organic series, or under its more modern cognomen in advanced scientific literature. It is suggestive

rather than profound, and perhaps that is a merit when we consider the hands into which it is likely to fall. Of faulty treatment, we may instance the section devoted to the Crocodilia as an example. We have no distribution of the Crocodiles described, and as the only species referred to is *C. niloticus*, a youthful enquirer might consider that the Crocodiles were confined to Africa. Moreover, the Garial and the Alligator are given as "Allied Species," when it would clearly have been more exact to write allied genera. But the book still fulfils a purpose of its own, and we know of no other that will make a child think more of the animals described; while, if the teacher is really capable of his or her implied function, some healthy commentation may be made, and some likely misconceptions be avoided.

The Fauna of British India, including Ceylon and Burma. Edited by W. T. Blanford. Arachnida, by R. I. Pocock. Taylor & Francis.

Since the publication a few years previously of Thorell's 'Spiders of Burma,' this is the most important work on the Eastern Arachnida that has appeared, and it altogether supplements Thorell's 'Monograph' by treating the Arachnida as a whole, including the *Scorpiones* (Scorpions), the *Uropygi*, and the interesting *Solifugæ*. Altogether three hundred and forty-three species are fully described—the *Araneæ*, probably owing to the exigencies of space, having a shorter diagnosis than the preceding orders—and the families and genera clearly characterized. The illustrations are not so numerous as in some other volumes of the series, but those given are apt, and of a structural description. The volume is a distinct addition to our knowledge of Indian zoology, and forms a worthy contribution to an excellent and much needed faunistic monograph relating to the Oriental Region.

EDITORIAL GLEANINGS.

Mr. W. L. Sclater, the Director of the South African Museum, has contributed an article to the January number of the 'The Educational News' of Cape Town on the "Migration of Birds in South Africa." Mr. Sclater estimates that there are about forty-four birds which migrate from Europe to South Africa.

Passerine Birds.—Golden Oriole, Spotted Flycatcher, Lesser Grey Shrike, Whitethroat, Garden-Warbler, Willow-Wren, Icterine Warbler, Marsh, Great Reed, and Sedge Warblers, Martin, Sand-Martin, Swallow, Yellow Wagtail, Tree-Pipit.

Picarian Birds.—Alpine Swift, Common Swift, Nightjar, Roller, Bee-Eater, and Cuckoo.

Game Bird.—Quail.

Shore Birds and Waders.—Pratincole, Caspian Plover, Ringed Plover, Kentish Plover, Green Plover, Turnstone, Avocet, Stilt, Great Snipe, Sanderling, Little Stint, Curlew-Sandpiper, Knot, Ruff, Common Wood and Green Sandpipers, Redshanks, Greenshanks, Curlew, and Whimbrel.

All these birds are summer visitors, only arriving in September and October, and leaving again in April. In most cases, at any rate, they do not breed in South Africa, although this season is the breeding one for other resident birds; but this is a special point which requires investigation.

One of the best known of these birds is the English Swallow, which must be carefully distinguished from the many other South African Swallows, many of which are resident and breed in South Africa. It may be known by its red forehead and throat, black-blue upper surface and chest-band, and buff-white abdomen. It is found everywhere in South Africa, from Cape Town to the Zambesi, from November to March; but when it arrives, after a journey of over six thousand miles, its plumage is much bleached, the throat is nearly white, and the chest-band pale brown. However, before leaving again for the north, it undergoes a complete spring moult, and sets off on its long journey in a complete new set of feathers.

In Natal Mr. Seebohm has observed that the Swallows remain till the first week in April, while other observers state that they arrive in North Africa during the last half of February, in South Europe during the first

half of March, and in Central Europe not until the last half of March. It is perfectly certain that the Natal Swallows, if they only leave during the first half of April, even allowing only a few days in which to accomplish a journey of five thousand to six thousand miles, must go to some part of North Europe or to North-west Asia, since the Swallows which breed further south have arrived at their breeding-grounds before the South African birds have left their winter quarters. So far as it goes, this evidence is conclusive that, in case of the European Swallow, the individuals which go further north to breed go further south in winter.

It has been asserted that some European Swallows remain in South Africa through the greater part of the year, and Andersson even asserts that in some uncivilized parts they affix their nests to some projection of a rock or trunk of a tree. More evidence, however, on this point is required.

Between August and April there can generally be seen about Cape Town and the suburbs large numbers of Black Swifts, flying often at a considerable height above the ground, as is their usual habit. Mr. Layard believed these to be the European Swift, which spends the summer months in Europe, and disappears southwards in August or September. A careful comparison, however, of the European and South African bird seems to show that there are differences between them, the African bird being somewhat larger and darker in colour. Hitherto no authenticated observation on the breeding of the Black Swift in South Africa has been made; but if, as is now supposed to be the case, the South African bird is distinct, it probably does nest somewhere in South Africa, and at any rate the birds from about Cape Town do disappear during the winter months. We do not know where they go to.

Besides the migrants from Europe who come to South Africa to avoid the northern winter, there are a good many birds whose breeding range is in South Africa, and who migrate northwards during the South African winter, probably to Central Africa; about the exact migration range of these birds much less is known than about the movements of the European birds.

Among the more familiar or better known cases are those of the White-throated Swallow, which remains only from August to March; the Pearl-breasted Swallow; the large Stripe-breasted Swallow, one of the most familiar of the group, which generally builds its nest—a retort-shaped chamber entirely constructed of mud pellets—over a porch under the shelter of a verandah. Among other groups are the Carmine-breasted Bee-Eater, only found in north of the Vaal River, and the solitary Cuckoo, commonly known as the "Piet Mijn Vrouw."

All these birds are found in South Africa during the South African

summer from September to March, after which date they are seen no longer, but are supposed to retreat northwards, to somewhere in Central Africa, for the southern winter.

We are glad to see that Mr. Herbert Goss has published a second edition, revised, of his 'Geological Antiquity of Insects.' Mr. Goss is thus doing in Britain a similar work to Scudder in America, and entomology, like other branches of zoology, is falling into line in the rejection of the idea that animal life is, or can be, only studied under present appearances. Zittel's 'Grundzüge der Palaeontologie,' which can now be consulted in an English translation, has the Insecta instalment naturally abridged. Mr. Goss has provided a much fuller essay on the subject, which is published at a small cost by Gurney and Jackson. Twenty years have elapsed between the appearance of these two editions, and the author, having put his hand to the plough, should not draw back, but give us a still fuller and more comprehensive work on the subject which he seems to have really made his own in this country.

On the Wheatears (*Saxicola*) occurring in North America—this question is discussed by Leonhard Stejneger in the 'Proceedings' of the United States National Museum (vol. xxiii. pp. 473–81). The common European Wheatear (*Saxicola œnanthe*) is a regular breeder in the United States, and Mr. Stejneger, following Degland (1849), Baird (1864), Gould ('Birds of Great Britain'), and more especially Lord Clifton ('Ibis,' 1879), not only recognizes two forms—a larger and smaller—both in Europe and America, but also applies a distinctive name, *Saxicola œnanthe leucorhoa*, Gmel., to the larger form of the species, which he thus diagnoses:—"Larger than *Saxicola œnanthe*, the length of wing varying between 100 and 108 millimetres; colour similar, but the rufous tints more bright on the average."

The artificial incubation of Alligator eggs is described by Albert M. Reese in the March number of 'The American Naturalist' (p. 193). The Florida Alligator lays her eggs, about thirty in number, in a so-called nest, which she constructs of sticks, leaves, earth, &c., on the banks of the pond or stream in which she lives. The eggs are laid in the cavity of the nest, and are carefully covered, and allowed to incubate by the heat of the sun. When the young Alligators are about ready to hatch they make a curious squeaking noise, which attracts the mother's attention, and she uncovers the eggs so that the young Alligators may not be smothered in the nest after they escape from the eggs. This fact was confirmed by the artificial hatching of a few eggs in an incubator at a temperature of 37° C. On

opening the incubator a couple of weeks after the insertion of some well-developed eggs "curious squeaking sounds were heard coming from the inside of the eggs, the sounds which in nature tell the mother that her young are about ready to hatch, and should be helped out of the mass of earth and leaves in which they are buried. These sounds are audible at a distance of fifteen yards or more, so that even when the eggs are buried in the nest the parent is probably able to hear the call of her young. The next day after the first sound was heard, one of the Alligators broke out of its shell, and a couple of days later two more hatched.

We have received a Report on the Sarawak Museum, written by Mr. R. Shelford, the Curator, dated February, 1901. Apart from the details of the very satisfactory progress in the growth of this happily situated institution, the most interesting biological information relates to the seasonal variation in the Rhopalocera. Mr. Shelford writes:—

"It is noteworthy that Bornean butterflies do not, to any great extent, exhibit seasonal variation; such species that do are quite irregular in their appearance, *e. g.* the collection contains a long series of the so-called wet- and dry-season forms of *Melanitis ismene* (Cr.) which have been caught at all months of the year, and many examples of both forms have been caught in the same month. *Neopithecops gaura* (Butl.) is equally erratic in variability. It appears probable that the markings and colouration of the imagos of these variable forms are dependent on the degree of damp or dryness to which the young stages (egg, larva, or pupa) are subjected; if this is indeed the case, a spell of wet weather in the fine monsoon—a by no means unusual event—would produce a crop of wet-season forms, and conversely a spell of fine weather in the wet monsoon a crop of dry-season forms."

Mr. Lionel de Nicéville, who has recently been appointed "Entomologist" to the Indian Museum, Calcutta, has recently published a most valuable paper on "The Food-Plants of the Butterflies of the Kanara District of the Bombay Presidency" (Journ. Asiat. Soc. Bengal, vol. lxix. pp. 187–278). Apart from food-plants, the larvæ of many butterflies will, when they cannot obtain vegetable food, eat each other, or soft newly-formed pupæ. The *Lycænidæ* appear to have the distinction in cannibalistic propensities. One larva of *Tajura cippus* has been known to eat up over a dozen young ones of its own species. The tendency to cannibalism is not confined to the *Lycænidæ*, but exists also among the *Pierinæ*; the larvæ of *Appias* will eat each other, and any other species of larvæ feeding on the same food-plant as themselves, if forced to it by hunger.

In the 'Transactions' of the Hull Scientific and Field Naturalists' Club for the year 1900 (vol. i. No. 111) the Secretary, Mr. T. Sheppard, has commenced a series of articles on "Bygone Hull Naturalists," in which the late George Norman (1823–1882) is the subject of the first memoir. Mr. Norman was an old and valued contributor to 'The Zoologist,' contributing no fewer than forty-seven notes between the years 1843 and 1864. An excellent portrait of Norman is given, and memoirs are promised of other Hull naturalists, including Adrian Hardy Haworth, Peter William Watson, Robert Harrison, and William Spence.

The Transactions and Annual Report of the Sheffield Microscopical Society (1899–1900) contain an abstract of a lecture delivered by Dr. H. C. Sorby, on "Improved Methods of Preparing and Preserving Specimens of Marine Animals." The use of glycerine was recommended.

"He found that, in thus treating a species of *Nereis* worm very common in some of the Essex estuaries, it was possible to dry small specimens and mount them in balsam without any of the minute blood-vessels being obliterated by decomposition. After trying many modifications of this process, the best results were obtained from the following method:—Specimens of the worm, about two or three inches long, were put direct from the sea-water into strong glycerine diluted with an equal volume of water. Here they quickly died, and, after remaining in it for about ten minutes, were seen to be much reduced in size by the transfusion of water into the glycerine. They were then transferred to water, and kept in it for about ten minutes so as to remove most of the glycerine, and to cause them to expand to about their original size. They were then quite limp, and could easily be arranged on microscopic-slide glasses, and were dried as quickly as they could at the usual temperature in the open air, and in doing so became thin, but shrank very little laterally. They were then mounted in balsam, under thin covers, in cells made of thin glass strips. When thus mounted they are not only permanently preserved, but, being made comparatively thin, flat, and transparent, the structure is seen far better than when the animals are alive or recently dead, and the natural red colour of the blood is preserved. When worms are preserved in alcohol or formalin they are rendered opaque, and the blood becomes brown."

In preparing marine animals as museum specimens, Dr. Sorby had had some beautiful results through using strong glycerine. The beautiful natural colours had been, he hoped, permanently preserved. Specimens of Sea-anemones and Star-fish thus preserved were shown, the natural shape of the animals and their delicate tints of colour being much admired.

Mr. J. C. Stevens sold, on April 15th, the library of natural history books formed by the late Mr. Philip Crowley, of Waddon House, Croydon. The following were the highest prices reached:—'Transactions' of the Entomological Society, 46 vols. and 4 parts, £38. 'Catalogue of the Birds in the British Museum,' 27 vols., £48. 'The Ibis,' 1859–1900, £75. 'Proceedings' of the Zoological Society, 1830–1900, £60. Lord Lilford's 'Birds of the British Islands,' 7 vols., £63. 'Biologia Centrali-Americana,' 35 vols., £90. 'Great Auks' Eggs,' 66 plates, £13 4s. Dresser's 'Birds of Europe,' 9 vols., £56. Grandidier's 'Histoire Physique de Madagascar,' 1875–95, £35 14s. Sander's 'Reichenbachia': Orchids, both series, £14. Gould's 'Birds of Asia,' £51: 'Birds of New Guinea,' £45; 'Mammals of Australia,' £29 8s.; 'Birds of Great Britain,' £49 7s. D. G. Elliot's 'Monograph of the Cats,' £10; 'Monograph of the Pheasants,' £53 11s. E. T. Booth's 'Rough Notes on Birds,' £25 4s. G. R. Gray's 'Genera of Birds,' £17 17s.—*Athenæum.*

Mr. G. W. Kirkaldy, in the last number of the 'Journal' of the Quekett Microscopical Club (April, 1901), contributes a paper on "The Stridulating Organs of Waterbugs (Rhynchota), especially of *Corixidæ*." The *Nepidæ*, *Notonectidæ*, and *Naucoridæ* are very briefly dismissed, as no stridulating organs have yet been discovered in these families, the limæ figured by Swinton some years ago being imaginary. In the *Corixidæ* the anterior tarsi are highly modified, being thickened and dilated—more or less knife- or spoon-shaped—in both sexes. In all the species of *Corixa*, there are in the male sex a number of chitinous "pegs" or "teeth" on the inner surface of the flattened tarsi. It was formerly supposed that the stridulation was occasioned by the rubbing of these pegs across the strongly keeled face of the bug. Kirkaldy points out, however, that the pegs exist only in the males, that the peculiar form of face is common to both sexes, and that it is protected by strong bristly hairs, and considers that stridulation is actually caused by the drawing of the pegs on the left (anterior) tarsus across a specially modified area (furnished with minute closely set chitinous points) on the inner side of the opposite femur, or *vice versâ*. These pegs do not exist in the closely allied genera *Micronecta* and *Cymatia*—being replaced by slender bristles—nor is there a specially modified femoral area; and Handlirsch, in a recent paper on the same subject, suggests that the long curved claw of the male in these genera may form part of the musical instrument. The remarkable "strigil" is supposed by Handlirsch to be a stridulating organ, though the present author is sceptical, pointing out that the "musical notes" have only been heard while the bugs are under water, when the abdomen is completely covered by the closely adpressed elytra and wings. It is thought possible that the strigil may be employed while the bugs are on the wing, migrating for mating purposes.